AGRICULTURAL NEWS LETTER

VOL. 13 - NO. 6 NOVEMBER-DECEMBER, 1945

This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations of the du Pont Company and its subsidiary companies. It also contains published reports and direct contributions of investigators of agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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Agricultural News Letter (Du Pont)
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U. S. BUREAU ISSUES COMPREHENSIVE, AUTHORITATIVE SUMMARY ON DDT

Do you want the whole story -- to date -- about DDT?

Then write the Press Service, U. S. Department of Agriculture, Washington 25, D. C., and ask for it. Request Release No. 1574-45, which gives a comprehensive and authoritative summary of all available information about this new "wonder" insecticide.

The statement, issued by the Bureau of Entomology and Plant Quarantine, covers 10 closely typed letter-size sheets. It contains suggestions regarding the use of DDT "to help answer inquiries by civilians." It points out that "knowledge of practical uses of DDT insecticides in agriculture and around the house is still far from complete," but adds that the Bureau, in cooperation with various state agricultural experiment stations, and other agencies, "has conducted many and extensive tests with DDT during the past 2½ years, and that information at hand indicates:

> For certain purposes and under certain conditions the effective and safe use of DDT by civilians at this time is possible."

The summary outlines numerous points about the use of DDT, its effect on users, plants, and on the soil. It points out, for instance, that at this time DDT insecticides "cannot be recommended for use on grain, forage, or other crops that are to be used for animal feed because of the possible danger associated with residues."

It recommends following the instructions of the manufacturers, and adds: "For the control of many crop insects it is now too late for the practical use of formulations containing DDT this season." And, until more complete information is available, government entomologists recommend that persons having DDT insecticides "try them on only a portion of a crop until it is certain that they will do the job satisfactorily."

The government statement says, however, that "despite these precautions, and the present uncertainties attending its use, the entomologists say that DDT will have an important place in insect control along with other materials already in use."

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EXPERIMENTS SHOW DDT HAS MANY AGRICULTURAL USES -- TESTS CONTINUE

DDT, the new insecticide that kills numerous insect species that carry illness to man, eat his crops, make him and his livestock uncomfortable, or spoil his food, seems most promising for control of stable flies, house flies, adult mosquitoes, and some other insect nuisances such as lice, fleas, and bedbugs.

That is a one-sentence summary of various detailed summaries of the information now available on DDT that have come recently from federal, state, and private sources. One of these summaries recently issued by the Iowa Agricultural Experiment Station, for instance, stresses the fact that while DDT has not been used long enough fully to determine its usefulness, its shortcomings, and its dangers, it has numerous agricultural uses that warrant much of the enthusiasm evidenced in its favor.

It has been demonstrated that DDT shows promise for control of certain insects on vegetable crops such as potatoes, squash, and cabbage; for control of European corn borers; for killing lice on chickens and in poultry houses; for destroying ticks on sheep and other livestock; and for other agricultural uses still under careful study. Because of numerous unanswered questions, such as the effect of DDT on the soil and long-lived plants; its killing of some beneficial as well as harmful insects; and its inferiority for control of certain pests; as well as its apparent complete inability to even harm such insects as the cotton boll weevil and some species of cockroaches, qualified entomologists all over the country urge everyone to use DDT with care until more is known about how, when, and where to use it.

Most entomologists at this time are reluctant to attempt to list the many different pests to which DDT is known to be toxic, especially since results of experiments in one state often vary from those in others. Some published results have been contradictory, sometimes because of differences in the manner of testing. Most consistent results seem to have been with household insects such as flies, carpet beetles, lice, fleas, bedbugs, adult mosquitoes, silverfish, and clothes moths, and in barns and among dairy herds to reduce the number of flies there.

Some Insects To Which DDT Is Known To Be Toxic

There is now rather general agreement that DDT is toxic to certain insects, including -- in addition to those already mentioned -- various ants, some subterranean termites, bean leaf roller, cabbage looper, cabbage worm, cowpea and rice weevils, flour beetles, southern army worm, squash bug, cotton bollworm, tarnished plant bug, white-fringed beetle, tobacco flea beetle, some grasshoppers, Oriental fruit moth, potato flea beetle, pea aphid, onion thrips, Japanese beetle, codling moth, tussock moth, grape leaf hoppers, Colorado potato beetle -- and many others.

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Among insects for which DDT has been found inferior to established insecticides are the sugar-cane borer, crossed-striped cabbage worm, Mexican bean beetle, certain grasshoppers, spirea and cotton aphids. It is comparatively ineffective against the boll weevil and the cotton leaf worm.

The proper formulation to use against each pest, the rate and time of applications, and whether or not DDT can be expected to give more satisfactory and more economical results than other available materials, have not yet been worked out for many insects.

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NEW DDT INTERIOR FINISHES RETAIN EFFECTIVENESS AT LEAST A YEAR

Several types of DDT interior finishes for the control of most insect pests in restaurants, stores, hotels, and homes which will retain their effectiveness for at least a year have been announced by John Marshall, chemical director of the Fabrics and Finishes Department of the Du Pont Company.

Laboratory and field tests over the past 12 months prove that highly satisfactory control of flies, silverfish, and mosquitoes can be obtained with properly formulated DDT finishes. Additional data indicate effective results also against most types of ants and cockroaches, clothes moths, carpet beetles, bedbugs, fleas, and many of the insects that attack stored food products.

Insects only have to crawl across a DDT-painted surface to pick up the microscopic quantity necessary to kill them.

The incorporation of DDT in finishes, Mr. Marshall says, considerably prolongs the effective life of the war-developed miracle insecticide.

Du Pont will not release its DDT finishes to the consumer until toxicological and service tests prove beyond question its suitablity for household and institutional uses.

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SPRAY BACK, SIDES, AND LEGS OF CATTLE WITH DDT TO KILL FLIES

Dairymen who have heard of the almost unbelievable results that DDT insecticide gives as a barn and cattle spray to kill flies -- as well as mosquitoes and lice wherever they appear -- will welcome the recommendations prepared as Mimeo. Circular No. M-148 by Dr. F. A. Fenton, Oklahoma A. and M. entomologist, at Stillwater.

Dr. Fenton recommends the use of water-dispersible insecticide powders containing from 40 to 50 per cent DDT. These should be diluted with water to 0.2 to 0.25 per cent DDT (one pound of 50% powder in 30 gallons) for spraying animals, and to 5% DDT (one pound of 50% powder per gallon of water) for spraying barns.

"On barns, use at the rate of 3/4 to 1 pint per 250 square feet of wall space," he says. "Two gallons will spray a small garage, and up to 50 gallons a large barn." He recommends spraying back, sides, and legs of animal thoroughly, but urges avoiding loss by runoff.

Spray Any Place Flies Congregate Around Barn

"Spray ceilings, walls, stalls, and floor of barn, or any place where flies congregate," Dr. Fenton recommends, "and remove or cover feed first."

The Oklahoma entomologist says one spraying in hot weather will control flies in barns and hornflies on cattle for two weeks with considerable control for the third week. He cautions that DDT will kill only about one out of five of the large horseflies found in pastures.

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PAINTING METAL STORAGE BINS WHITE KEEPS GRAIN COOL - REDUCES INSECT DAMAGE

"One of the principal difficulties encountered in grain storage in the southern part of the Grain Belt is the activity of insects in the early spring months," says L. A. Niven in "The Progressive Farmer" for September, quoting information made available by the U. S. Bureau of Plant Industry.

If stored in metal bins that are exposed to the sun, and these are painted white on the outside, the temperature of the grain within the bin will be about 10 degrees lower than in similar unpainted bins, a difference sufficient to keep dormant insects from reproducing for about a month, Mr. Niven explains.

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STATEMENT ON COOPERATION ADDED TO DEFINITION OF RESEARCH

"Those who have been in the office of the graduate dean at Iowa State College may remember a quotation from Alfred D. Flinn that hangs on the wall.

"'Research is the earnest, purposeful, persistent, intelligently directed effort to gain new knowledge of a selected subject. The spirit of research is devotion to truth and insistent longing for better understanding.'

"May I add a paragraph:

"Cooperation in research is the fulfillment of a desire on the part of two or more individuals that through planning and working together there may be the maximum intelligent use of all available resources to the end that undersirable duplication in research be avoided, at the same time making sure that there are no serious gaps in coverage."

--Dr. R. E. Buchanan, Graduate Dean,
Iowa Agricultural Experiment Station

IOWA DEAN OUTLINES NEED FOR COOPERATION IN ANIMAL-HUSBANDRY RESEARCH

Estimating that it would require an endowment of more than a half a billion dollars to maintain the income of the approximately twenty million dollars needed for annual expenditures for research by the state agricultural experiment stations, Dr. R. E. Buchanan, graduate dean of the Iowa Experiment Station, recently said that at least one-fifth of this total endowment, or a hundred million dollars, would probably be for animal-husbandry research alone.

Discussing cooperation in animal-husbandry research in a paper before the annual meeting of the American Society of Animal Production, Dr. Buchanan stressed the fact that cooperation, both regional and national, is well underway, being "reasonably adequate in some areas, more desirable in others."

He said the most numerous of the various research agencies for animal husbandry are the 52 state and territorial experiment stations.

"Their administration is not tied closely to the federal government -- by no means as closely, for example, as is that of the Agricultural Extension

Continued on next page

Service," he said. "These experiment stations have considerable resources in funds. Each expends annually more than a hundred thousand dollars on its research; some spend considerably more than a million.

"I have no adequate data that would tell what proportion of the annual expenditures of the stations is devoted to research in animal husbandry in its many aspects, but I suspect that it would require an endowment of a hundred million dollars or more to maintain our present output in this field.

"Obviously, if there is to be adequate coordination in the program, if inadvisable duplication is to be avoided, the stations should work together and plan together. And gradually they have developed some techniques for handling cooperation. These should be clearly understood by all our workers in animal-husbandry research."

Numerous Agencies Significant In Agricultural Research

The Iowa dean stressed the fact that there are numerous other agencies "significant in agricultural research, including animal husbandry," such as the regular bureaus of the U. S. Department of Agriculture, particularly the Bureau of Animal Industry for study of problems too extensive to be handled by single stations; regional laboratories authorized under the Bankhead-Jones Act; the four regional laboratories at Philadelphia, San Francisco, Peoria, and New Orleans; breed associations and breeders; marketing and other committees; and processors of animals.

He made it clear that cooperators must include the processors themselves, the research laboratories of the packers, the physiological chemists, the specialists in food, in nutrition, in experimental cookery, and in consumption economics, as well as several other "increasingly important agencies."

Cooperative Bankhead-Jones Regional Laboratories Lauded

Dr. Buchanan said that "the technique of cooperation provided by the Bankhead-Jones regional laboratories is proving satisfactory and is a pattern which may well be followed safely in other cooperative enterprises." Among these, he mentioned the laboratory for sheep breeding in Idaho, the regional swine-breeding laboratory in the North Central region, poultry disease laboratory at East Lansing, Mich., and the laboratory for study of diseases of livestock at Auburn, Ala.

"On the whole, I believe that the cooperative Bankhead-Jones laboratories are among the most promising of the adventures in state-federal relationships in research," he said.

Many Difficulties and Problems

He did not minimize the difficulties involved. He stressed the need for large numbers of animals and considerable periods of time for animal-breeding studies, which he said would seem to require regional cooperation.

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"Another practical problem is to clarify the understanding of breed association officers and breeders of purebreds with respect to improving swine further through breeding," he said. "Still another difficulty in cooperation in animal breeding is the problem of disease."

Need for Cooperation on Research Involving Public Health

Dr. Buchanan said that "some day the public will wake up to the fact that millions of dollars spent on sewage disposal plants and water purification systems have largely disposed of enteric diseases in man in many of our states. But literally we are doing absolutely nothing to prevent the transmission of swine diseases to man. Our records in Iowa show hundreds of cases of brucellosis in man each year, and with good evidence that the majority are of swine origin. Swine erysipelas is likewise transmissible to man. This is not a scare statement, but the situation is bad enough so that from the public health point of view some millions ought to be spent both in control of the disease and in breeding for disease resistance.

"Increasingly our experiment stations will be the agencies to which those who supply breeding stock to farmers will look for foundation stock. We dare not sell animals, even hogs, that are not free from disease. They must be sold on the basis of reasonable proof that they are not carriers. We need the more active and more intelligent use of the men in veterinary science, not only the practicing veterinarian, but the expert pathologist and immunologist.

"There is far too much of an attempt to ignore disease implications on the part of our animal husbandry men and too much of professionalism on the part of our veterinary scientists. And both need to work with our public health agencies."

Cooperators Must Come From Large Number of Groups

The speaker said that in the problems of management, physiology, and nutrition, the need for regional cooperation is not quite so necessary as in breeding. He felt that problems of marketing are especially satisfactorily approached upon a regional basis.

"In agriculture we are interested not only in the production of animals and their marketing, but the processing of these animals, their acceptability to the retailer and to the ultimate consumer, and their palatability and nutritional value. Regional and national cooperation is highly desirable in research in all these fields. This is well illustrated in the studies in the development of dried eggs and similar products during the war, in which cooperation was initiated and stimulated by the Army.

"But the cooperators must be drawn from a large number of groups."

NOTE: A reprint of the complete paper by Dr. R. E. Buchanan, published in "Journal of Animal Science," May, 1945, Vol. 4, No. 2, pps. 87-95, will be sent upon request addressed to him at Iowa State College, Ames, Iowa.

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PLASTICS GO A-DAIRYING

> "War or no war, plastics are destined to play an important role in the food and dairy industry, and will receive the ever-increasing attention of the producer, processor, and allied fields."
>
> - "The California Dairyman."

An effort to make a better plastic mouthpiece for a clarinet has led to research into milk filler valves, centrifugal pumps, and chlorine spray guns for the dairy industry, machined to fine tolerances from "Lucite" methyl methacrylate resin.

Harry Canterbury, Maywood, California engineer, started his experiments with plastics more than eight years ago while seeking a finer tone quality for his musical instrument.

"The mathematics and science of sound he found extremely elusive when applied to the curvature of the mouthpiece of the clarinet upon which the reed is clamped and vibrates," says "The California Dairyman," Vol. 24, No. 4, in telling the story under the heading "Plastics Go A-Dairying." "Out of this experimenting, Mr. Canterbury perfected machines and tools which hold tolerances within .0002 inches, comparable in accuracy to our finest work done on metals in most metal manufacturing plants."

The article says that application of "Lucite" to other fields was a natural development. In 1943 Mr. Canterbury and his partner, Mr. Stock, turned to possibilities in the dairy industry.

"Lucite" Possesses Special Properties

"Possessing the properties of transparency, strength, chemical inertness to most acids, alkalis and salts, particularly those in common use among dairymen, odorlessness, hardness, etc., 'Lucite', the boilable type, will withstand 235 degrees Fahrenheit for 15 minutes. It has an unusually high shock resistance for thermo-plastics. It is proving an indispensable substitute for many strategic metals, and will probably attain a permanent place in post-war fabrication of many pieces of dairy machinery, equipment, and supplies," The article says.

Continued on next page

Because of the war, the experimenters were unable to obtain the high heat-resistant (boilable) "Lucite", so they worked with a form that softens when subjected to a temperature of 175 degrees F. for five minutes.

"Even with this handicap, the use of chlorine sterilizers offers an excellent solution, so that sanitation requirements can be adequately met and maintained," the article continues. "Mr. Canterbury has made an engineering contribution to 'Lucite' similar to that of dairy machinery and equipment manufacturers in their pioneering with stainless steel fabrication and welding. New adaptations of existing machine tools were used; very precise new special methods and new types of tools were also created to overcome many unforeseen and unprecedented machining problems.

"Mr. Canterbury is particularly proud of his 'Lucite' coil spring, which is not susceptible to fatigue as are metallic springs, and which has many important applications in electrical and magnetic instruments where metal itself imposes many difficulties. 'Lucite' screws are made as fine and delicate a size as 2-56 machine thread, and by simply rounding off the edges of the threads, they will not chip."

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NEW ENGLAND FARMERS FIND DITCH DYNAMITING "BETTER THAN A MOVIE THRILLER"

"Bang! There was a ditch!"

That's how Fred E. Beane headed his little story on a ditch-dynamiting demonstration at Benton Flats in East Haverhill, N. H., in a recent issue of "New England Homestead."

Mr. Beane reports that things happended "with a bang" on Harry Lackie's dairy farm, for "Harry had dynamite experts on hand to blast a drainage ditch through 3,200 feet of meadow swamp, where 1945 heavy rains have raised havoc with 200 acres of land."

"Harry had 100 farmers from a radius of 35 miles on hand to watch the process, and they got a real show," Mr. Beane says. "The three Lackie boys and the expert would lay down 300 feet of dynamite through the meadow -- then came one resounding boom, sending hundreds of tons of muck, sticks, and water into the air -- and there was the ditch. It was better than a movie thriller, all hands agreed."

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WHY BOTHER WITH TROUBLE AND EXPENSE OF SOIL DRAINAGE?

"Drainage will convert a cold, damp, heavy soil into a warm, mellow, and easily tilled one, and it will make the soil more retentive of fertilizer and necessary moisture, thereby putting the soil into the necessary physical condition for producing the best crops," according to Pennsylvania Extension Circular 112, reviewed briefly below. "It frequently has been demonstrated that the increased yields of farm crops will pay for the cost of drainage in one to three years."

Bulletin Lists Ten Benefits from Drainage of Wet Soils

The bulletin lists the benefits resulting from drainage of wet soils under ten headings, as follows:

1. Increases supply of available plant food.
2. Helps the growth of desirable organisms.
3. Improves granulation; well-drained land is easily cultivated.
4. Conserves moisture in dry years.
5. Raises soil temperature by reducing evaporation and water content.
6. Enlarges root zone for crops, a big help in drouths.
7. Reduces loss from freezing or "heaving".
8. Reduces erosion or hillside washing.
9. Firms the soil by removal of saturating water.
10. Improves health conditions, particularly for stock.

AGRICULTURAL ENGINEER SAYS EFFICIENT FARMING AIM OF GOOD SOIL DRAINAGE

By L. F. Livingston

With the assertion that "the farmer pays for good drainage whether he has it or not," John R. Haswell offers a comprehensive discussion on why and how to "Drain the Wet Spots" for efficient farming in Pennsylvania Extension Circular 112, recently revised.

In Pennsylvania alone, four million acres of land "could be benefited by drainage," Professor Haswell, who is extension agricultural engineer in that state, says. He explains that permanent and winter springs, seeps, and "spouty" places, or just "low" spots supply the water.

Wet Soil Soft in Spring, Hard in Summer -- Often Called "Ledda Buddom"

He says in parts of Pennsylvania over-wet soil is usually cold, too soft in the spring, and too hard and dry in summer. In parts of the state it is

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known as "ledda buddom." It is often bluish-gray, frequently mottled with reddish brown spots, the latter color denoting lack of air and disappearing after drainage and proper agricultural treatment, particularly with lime, fertilizer, and cultivation.

"Many fields in Pennsylvania cannot be brought to a uniformly high state of cultivation throughout the entire area because they are too wet in spots," he says. Yet, he adds, "often one under-drain, judiciously placed, will save acres of lower seeped land."

He warns, however, that "partial drainage often is worse than no drainage at all, since it tempts the farmer to plant where the success of the crop is doubtful.

Tile Drains Superior for Open Fields and Orchards

Professor Haswell contends that open ditches as field drains have no place in modern farming, but that tile drains, properly spaced and at the most effective depth, occupy no useful land, permit the field to be cleanly cultivated, and let the water percolate through the soil rapidly. He gives full instructions regarding tiling in both open fields and orchards, discussing in detail the standard systems of drainage -- random, gridiron, and herringbone -- and combinations of these methods.

Open Ditch or Creek Often Needed As Outlet for Farm Tile Drains

The Pennsylvania agricultural engineer says tile drains are permanent and seldom need cleaning, such as an open ditch regularly requires, but makes it clear that "it is often impossible to get a good outlet for farm tile drains without opening up some creek or outlet ditch." In this connection, he says:

"The design of satisfactory outlet ditches for large areas is a difficult problem, requiring much training and experience. In Pennsylvania, the usual work will not require more than a 4-foot minimum bottom with side slopes no steeper than one horizontal to one vertical. The depth should be such as to allow for a foot or two of silting up and a depth of 3 feet for the tile farthest back from the ditch. It would seem, therefore, that a depth of outlet ditches of at least from 5 to 7 feet should be adopted. Any less will endanger the system.

"The above minimum size of drainage ditch can be constructed with a dredge or excavating machine, but unless much work is available it seldom pays to move one on the job. Of course, the larger sizes of ditches demand a machine."

Best Use of Dynamite Is for Opening Tile Drain Outlets

Discussing the use of dynamite, Mr. Haswell says:

"The best use of dynamite is in opening or cleaning out ditches and small creeks to a depth sufficient for tile drain outlets from the adjoining fields.

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A single open ditch in a wet valley seldom will drain it sufficiently for crops, and usually some intercepting tile drains are needed at the 'toe of the slope' on the edge of the flat. It works well in wet, wooded sections which would be difficult to dig by hand or with small machines. The shattered bottom is not a suitable bed for tile for several years.

"In order to use the most economical method of blasting, 'propagation', the soil must be wet. Only one cap is used in one stick or charge, and all the other charges are exploded by the wave action of the blast carried by the water in the soil from one charge to the next. Since a cap costs about as much as a half-pound stick of dynamite, the saving from only one per blast in the propagated method, instead of a cap in every charge, is apparent.

"Light, mucky soils blast better than heavier sands and gravel. The latter seem to hold up the wave action, as is also the case with roots, stumps, road crossings, and stone fills. A general rule is to squeeze a handful of soil and if water comes out between the fingers the soil is wet enough to blast.

"The moisture in the soil seems to be more deeply distributed in the spring than in the fall. Better results usually can be secured in the earlier season, especially if there has been a summer drouth."

Emphasizes Safety Precautions

Under the section heading, "Dynamiting Open Ditches," in addition to the discussion of soil conditions as quoted above, the bulletin explains the kind of dynamite to use, and gives helpful information on loading, exploding, and equipment. In giving full safety instructions, it emphasizes that blasting caps and dynamite should be stored in separate buildings at a safe distance apart, away from dwellings, and under lock and key where children and irresponsible persons cannot tamper with them.

NOTE: A copy of the bulletin discussed above will be sent upon request addressed to Mailing Room, The Pennsylvania State College, Agricultural Extension Service, State College, Penn.

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U.S.D.A. DISCUSSES INSECTICIDAL AEROSOLS FOR CONTROL OF DISEASE-CARRYING INSECTS AND OF AGRICULTURAL AND HOUSEHOLD PESTS

Insecticidal aerosols, millions of which have been used by the armed forces for destruction of such disease-spreading insects as the malaria-carrying mosquito, show encouraging promise for control of agricultural pests of garden and field crops, as well as greenhouse and household pests, according to the U.S. Department of Agriculture.

Non-toxic pyrethrum aerosols for which "a commonly used refrigerant, 'Freon-12' (dichlorodifluoromethane), was found to be a suitable solvent and propellent," have proved highly efficient against many disease-carrying insects in military barracks, tents, foxholes, in open air under quiet conditions, and in military transport planes, says the U.S. Agricultural Research Administration's recently issued Research Achievement Sheet No. 27 (E), "Insecticidal Aerosols."

This Sheet, by R. C. Roark and C. P. Clausen, points out that "Present aerosol investigations by various agencies also include application of fungicides, plant hormones, and germicides.

"The saving in human life and health through control of disease-carrying insects has incalculable military value during the war, and promises to have even greater social and economic usefulness for civilians after the war through its use in preventive medicine and in the control of agricultural and household pests."

L. D. Goodhue, W. N. Sullivan, J. H. Fales, and E. R. McGovran are listed as scientists in the Bureau who conducted work with aerosol research and development.

AEROSOLS SHOW PROMISE FOR CONTROL OF AGRICULTURAL AND HOUSEHOLD PESTS--ALSO FOR DISPERSING PLANT HORMONES AND FOR DISINFECTING ENCLOSED SPACES

More than 35,000,000 "bombs" or dispensers were delivered to the armed services of the allied nations up to June, 1945 -- five years after their introduction. Many more millions have been produced in the intervening months for use in the Pacific areas, where they are used to kill certain disease-carrying insects. And, many more millions are expected to be used in the coming years for control of agricultural and household pests and for other specialized purposes.

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"Bombs" Now Used to Disperse DDT

The "bomb", containing pyrethrum or -- more recently -- pyrethrum and DDT as active insecticidal ingredients, is usually a pint-sized throw-away container made of lightweight steel from which an aerosol -- or mist -- is discharged through a valve.

Information reaching the "Agricultural News Letter" through the U.S. Bureau of Entomology and Plant Quarantine indicates that government research entomologists expect a large use of aerosols for the control of insects on truck crops. The Bureau has been experimenting on the Eastern Shore of Maryland, in the truck-crop areas around Westminster, Md., and in Maine, with aerosols for control of the bean bettle. These experimenters have developed a mobile machine equipped with nozzles for ejecting the liquefied gas. A cylinder of "Freon-12" with dissolved insecticide is mounted on top of the machine, and aprons in front and behind keep the air currents from blowing the aerosol away before it settles among the plants. The control in these tests was described as nearly perfect, and the cost well within reason.

"Freon-12" Projects Insecticide Into Air as Finely Divided Flak

A high-grade insecticide, such as that used by the U.S. and Allied armed forces, is truly soluble in liquefied gas, according to W. W. Rhodes, chairman of the aerosol committee, Compressed Gas Manufacturers' Association. Mr. Rhodes, who is sales director of Kinetic Chemicals, a Du Pont affiliate, in a bulletin on "Aerosols," recently issued by the Association, says:

"When an aerosol containing dichlorodifluoromethane, sold under the trade mark 'Freon-12', as a propellent changes from the liquid to the gaseous phase, it expands at 70°F. two hundred and sixty times the volume it occupied in the liquid phase."

Mr. Rhodes likens the action to an explosion, because it occurs in an infinitesimal period of time and blows apart the insecticidal materials, projecting them as finely divided "flak" into the air.

Tiny Particles Float In Air About 20 Minutes -- Penetrate All Directions

These tiny particles remain in the air for an effective period of about 20 minutes, as their size is only 2 to 12 microns, and are carried by air currents in all directions, Mr. Rhodes says. He cites experimental work at the Beltsville laboratory of the U. S. Department of Agriculture, where aerosol was liberated in a ground-floor workroom.

"Air currents carried it along a long corridor up the stairs, and it killed test mosquitoes in a second-floor workroom many yards from its point of liberation," he notes. "Aerosol liberated in the top story of a building will find its way to lower stories and kill mosquitoes on the ground floor and in the basement. In this respect, though it is only an air colloidal substance, it behaves much like a true gas."

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Sesame Oil Combines Too-Small Particles -- Also Has Synergistic Effect

"When the particle size of the air colloid is too small to be effective against a particular insect, it may be modified by adding a small amount of suitable oil to the aerosol which sticks together a group of particles," Mr. Rhodes explains.

Sesame oil is suitable for modifying particle size. This oil is also a so-called insecticidal synergist, a substance that, when added to a killing agent, intensifies the killing power of such agent.

Recent Army Specifications Call for DDT and Pyrethrum

Mr. Rhodes says the formula used by the Army for many months following the original experimentation called for 5% of a 20% pyrethrins concentrate, 2% sesame oil, and 92% "Freon-12". During recent months, the Army specifications for aerosol bombs to be used in Pacific areas called for about 3% DDT and about 2% pyrethrum, plus the necessary amounts of "Freon-12" as the dispensing agent.

Other Uses for Aerosols Are Being Explored

"Insecticidal aerosols are not the only aerosols which may become of economic importance," Mr. Rhodes says. "Already the United States Department of Agriculture and the Boyce Thompson Institute for Plant Research have experimented with aerosols containing plant hormones."

He explains that these plant hormones are substances with the capacity to change sex characteristics of plants.

"The guinea pig of the plant experimenter is the tomato plant, and it is possible by an application of ortho-chlorophenoxyacetic acid ethyl ester in an aerosol form to the plant to produce tomatoes which are seedless, to have the tomatoes ripen two weeks earlier than the normal ripening period, and to obtain a set of 90% of the tomatoes from the buds. It is easy to be seen that this is very important to the commercial tomato grower as he can secure a much larger crop of very fine-grade tomatoes. The application is an easy operation as only one bud cluster of a tomato plant need be exposed to a minute quantity of the aerosol in order to achieve the effect.

"Another problem possible of accomplishment is the treatment of orchards with an aerosol containing one or another of the hormones. It is expected that if an orchard is treated while the flowers are in bloom one year that the blooming period may be retarded two weeks in the next year. This will prevent the losses of buds from late frost which occur in some of the northern climates.

"Furthermore, hormone aerosols in the future may be applied as the fruit is ripening to prevent the drop of the fruit. These hormones reduce the abscission of the stem which occurs just before ripening, causing an economic loss of a considerable part of the fruit.

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"Another aerosol problem is to find one that will kill bacteria and by the easy method of application prevent infections in operating rooms, in the general space of hospitals, in the home, on public conveyances, and in all sorts of enclosed spaces. A start has been made and propylene glycol has been tested by a group under the leadership of Dr. O. H. Robertson of Chicago. Unfortunately, this chemical is effective only if there is considerable humidity in the air. Research is continuing its quest for a chemical which may be easily projected and is effective under a wide range of temperature and humidity conditions.

"The liquefied gas aerosol method of applying chemicals is, therefore, of a revolutionary character and it seems probable when the scientific explorations are completed that it will have a great effect on the prolongation of life, the elimination of insect-carried diseases, and the economic production of vegetables and fruits, contributing, therefore, much to the general advance in civilization."

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NEW TEXAS PLANT TO MAKE PHENOTHIAZINE AND OTHER AGRICULTURAL CHEMICALS

Quantity production of the livestock remedy phenothiazine, new organometallic fungicides, organic-sulfur seed and turf disinfectants, and other crop-saving chemicals is planned upon completion early next year of the new $2,500,000 manufacturing plant, now under construction on the Houston-Galveston canal near La Porte, Texas.

"Just before the end of the war with Japan, the War Production Board approved the company's plans for the construction of these manufacturing facilities," according to an official of the Grasselli Chemicals Department. "With the easing of government restrictions, which held up the start of building operations for well over a year, every effort is being made to get this plant completed and in operation to serve American agriculture as soon as possible."

Manufacture of several products, now being made in limited quantities elsewhere, will be transferred to La Porte for production in amounts to meet anticipated future needs. One of these is phenothiazine, a livestock remedy characterized by the U.S. Department of Agriculture as the wonder drug that kills more kinds of internal parasites in more kinds of animals than any other known chemical.

Other agricultural chemicals to be made at the Texas plant include two new materials known as "Fermate" fungicide and "Zerlate" fungicide, based on the iron and zinc salts, respectively, of dimethyldithiocarbamic acid. And, in addition, the Texas plant will produce "Arasan" seed disinfectant and protectant and also a turf-disease fungicide, the latter two based on the chemical compound known to scientists as tetramethylthiuramdisulfide.

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GOOD ANTI-FREEZE PROTECTS DOWN TO 215° BELOW ZERO

Farm families and others who operate automotive equipment have learned -- some the hard way -- that when the water in an automobile or tractor cooling system freezes it expands, and thus exerts a powerful force that often cracks and splits engine blocks, radiators, water pumps, and cylinder heads.

Such freezing can be prevented simply by adding an anti-freeze mixture. A good anti-freeze can protect down to a temperature of 215 degrees F. below zero.

Du Pont anti-freeze technologists point out that while many substances will prevent water from freezing, only a few are suitable for use in automobile engines. They say certain salts will prevent freezing. But salt water rusts iron at a tremendous rate and corrodes copper. Putting salt water into an engine, these experts warn, is a sure way to ruin it.

They point out that all Du Pont chemical compounds used for this purpose, whether made of methanol ("Zerone" anti-freeze), ethanol (Five Star anti-freeze and War Emergency "Zerone" anti-freeze), or ethylene glycol ("Zerex" anti-freeze), not only prevent freezing but also protect the cooling-system parts against rust and corrosion, as discussed briefly below.

GOOD ANTI-FREEZE ALSO HELPS AVOID RUST, CORROSION, AND SCALE IN COOLING SYSTEM -- SOMETIMES RUST INHIBITOR AND CLEANSING SOLUTION ARE REQUIRED

Rust, corrosion, and scale -- chemical troubles that seriously harm the cooling systems of automobiles and tractors -- can largely be avoided or corrected by chemistry.

Water is the principal source of these three troubles -- yet water must be used to cool the engine.

As an engine continues to run, a constant supply of cool water must circulate through the cooling system at the rate of about 50 gallons a minute to prevent overheating.

The water used for this purpose often contains small quantities of minerals or chemicals that also affect the cooling system. Some of the "impurities" cause rust to form more rapidly; others tend to corrode the copper radiator. Other water conditions, or an "acidity" that may be created in the cooling system, corrode the engine block and the impeller blades of the centrifugal water pump, resulting in slow circulation and overheating.

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Du Pont Booklet Tells How to Prevent Cooling-System Troubles

"Water to which an effective rust inhibitor has been added will not rust iron," according to a Du Pont Ammonia Department booklet called "Take Care of Your Cooling System," now in its second edition, copy of which will be sent on request to the editor of the "Agricultural News Letter." "Thus," it explains, "the logical thing to do is to put a rust inhibitor in the cooling water. Since a good anti-freeze contains a rust inhibitor, the thing to do is to keep some anti-freeze in the cooling system at all times -- summer and winter. This will also help protect the engine from corrosion."

The booklet says the greatest trouble minerals in the water cause is the formation of a hard, rocky scale or "crust" on the inside of the various water passages of the engine cooling system.

"This scale, like rust, reduces the transfer of heat, first, from the cylinders to the cooling liquid, and second, from the cooling liquid to the copper of the radiator," it says. "In combination with rust it also helps clog the radiator.

"The protection against scale is also simple. If the water in the vicinity is extremely 'hard', it is advisable to use rainwater in the radiator. Since this may not be practical, another method is to clean scale formations from the radiator twice a year."

The booklet points out that inhibitors will not remove rust or scale already formed. Also, grease and oil often get into the cooling system and coat the inside of the radiator and cylinder walls -- another factor that stops the transfer of heat.

"Thus a good cleaning solution is needed to purge the cooling system. Du Pont Cooling System Cleaner will do the job," the booklet says.

It also emphasizes the importance, when a cleaning job is finished, of putting the rust inhibitor or an anti-freeze containing a good chemical inhibitor into the radiator.

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SCREWWORM SITUATION SERIOUS FOR FALL SHEARING PERIOD IN SEVERAL AREAS

Entomologists of the U.S. Department of Agriculture report the screwworm fly population was the highest in July for the past six years -- an increase of approximately 25 per cent over that of the last part of June. Heavy infestations of stock are expected to produce a serious condition for the fall shearing period. Weather conditions have favored the development of the flies on the Edwards Plateau in Texas north to Kansas where heavy infestations of the fly have been reported, but conditions have been unfavorable from eastern Texas to Georgia and eastern New Mexico through California. Fly development in Florida and southeastern Georgia has been unusually favored by the weather. "Smear 62," the government formula containing diphenylamine, is recommended for control of this serious livestock pest.

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CHEMISTS AND OTHERS IN RESEARCH LABORATORIES TO OPEN UP NEW FRONTIERS

"I want to say to the American people, most emphatically, for what it is worth, that ours is not a finished economy. We have scarcely begun to begin."

This is the challenge flung to the American people by James Truslow Adams in his new book "Big Business In A Democracy," (Charles Scribner's Sons, New York, $2.75), which points out that while "the geographical frontier may have been officially declared closed in the Census of 1890," the field opened up by chemistry alone "is so vast that we cannot cover even a minute portion of it."

Mr Adams touches briefly on various phases of agriculture, and the effect of chemistry and research on the economic, social, and other changes involved.

On Threshold of Chemical Age

"We are now on the threshold of the chemical age, with its utterly illimitable possibilities as compared with those offered by mere empty land, steam or even electricity," he says. "There is no conceivable limit to the changes to be made in life, the possible variety of new goods, the possible increase in jobs which may be involved."

The author emphasizes the point that "we cannot go on to more goods and more jobs without research, but research is slow, risky, and expensive." Money for it, he says, can come from only two sources, private savings -- corporate or individual -- or the government.

"On the new and strange frontiers to come, frontiers opened up not by Land Acts of Congress in an empty geography, but by the discoveries of chemists and others in research laboratories, backed by venture capital, we Americans will go on to greater conquests -- not of territory but of well-being -- for ourselves and for all people," he said.

Research Is Industrial Prospecting

Mr. Adams quoted Vice President Kettering of General Motors on research as follows: "Research is industrial prospecting.....It is an organized method of finding out what you are going to do when you can't keep on doing what you are doing now...It is a state of mind."

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